Fig.1

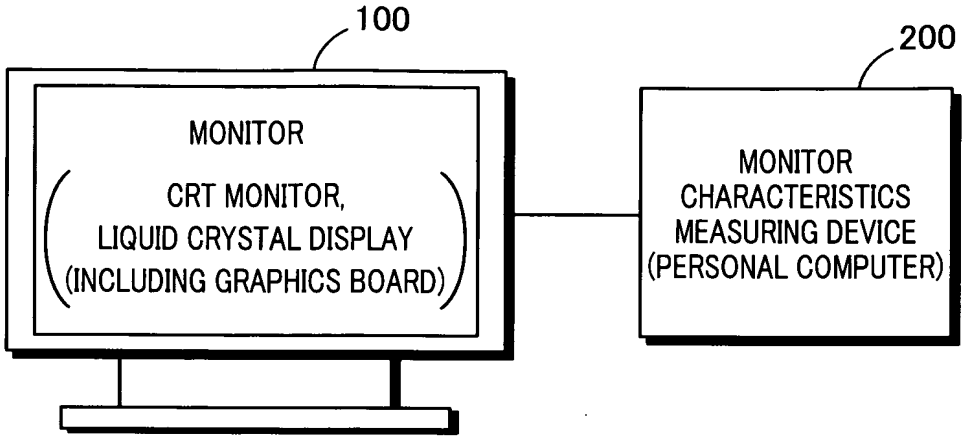

100
200
MONITOR
CRT MONITOR,
LIQUID CRYSTAL DISPLAY
(INCLUDING GRAPHICS BOARD)
MONITOR
CHARACTERISTICS
MEASURING DEVICE
(PERSONAL COMPUTER)

Fig.2

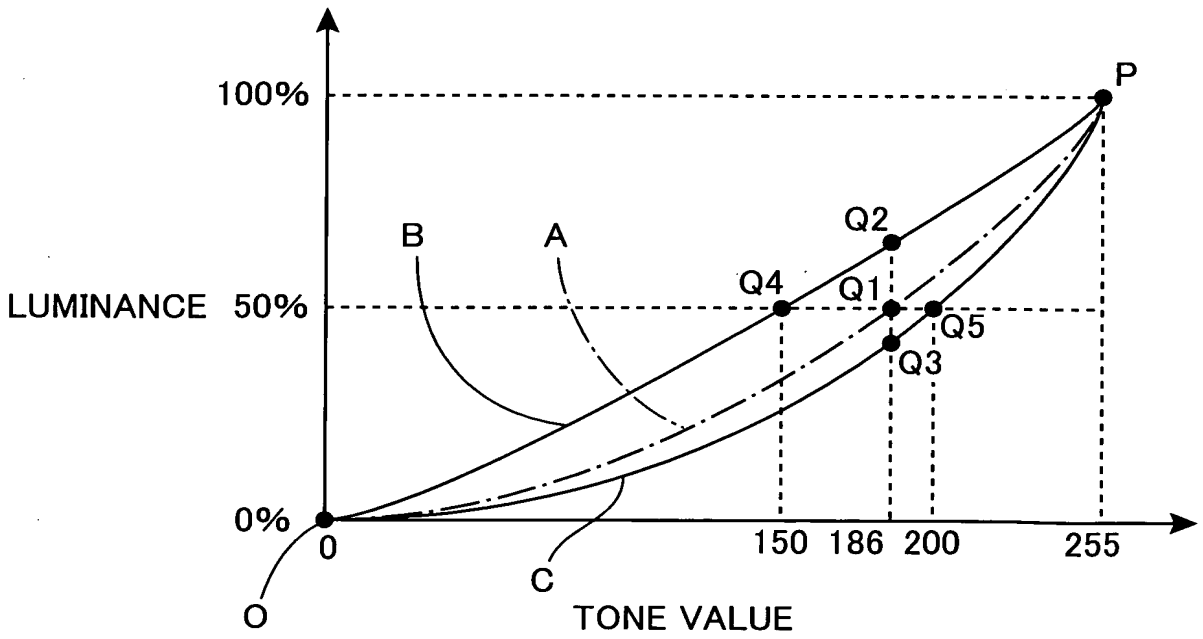

100%
50%
0%
LUMINANCE
P
Q2
Q4
Q1
Q5
Q3
B
A
C
O
0
150
186
200
255
TONE VALUE

Fig.3A

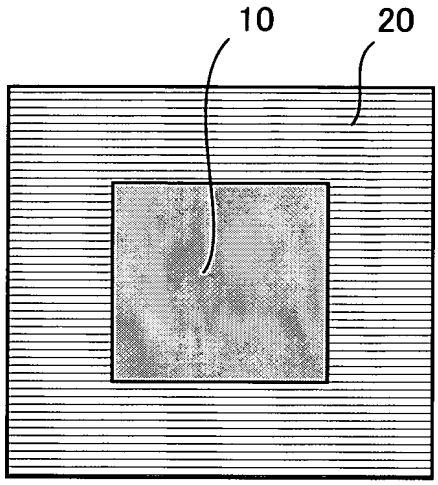



Fig.3B

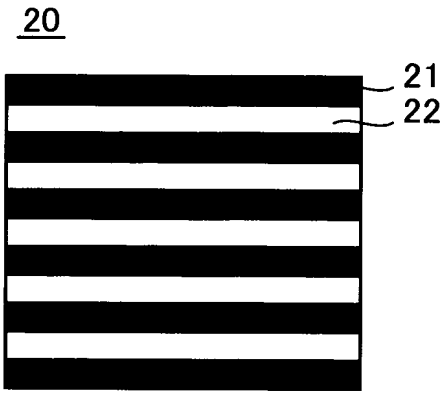



Fig.4

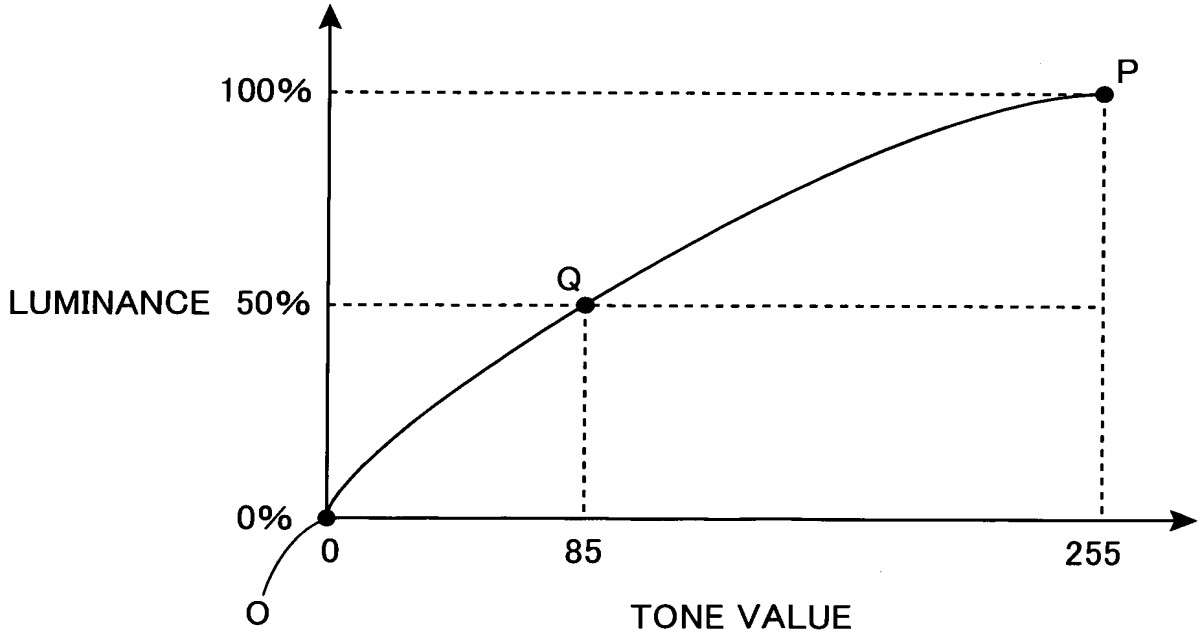


Fig.5

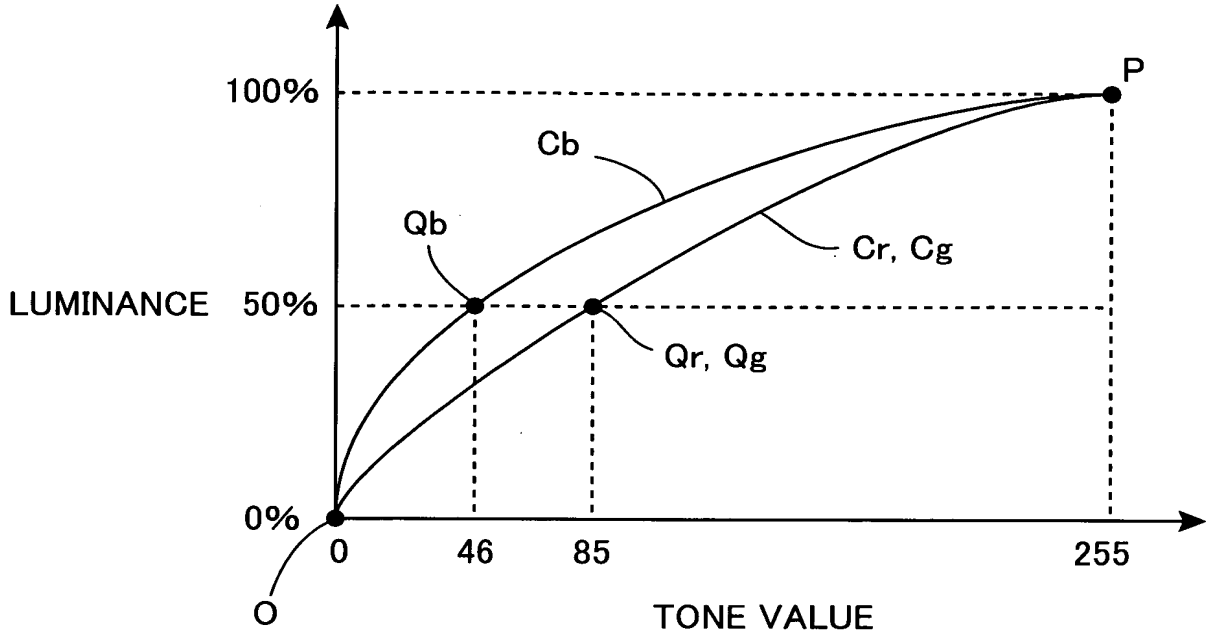

100%
P
Cb
Qb
Cr, Cg
LUMINANCE
50%
Qr, Qg
0%
0
46
85
255
O
TONE VALUE

Fig.6

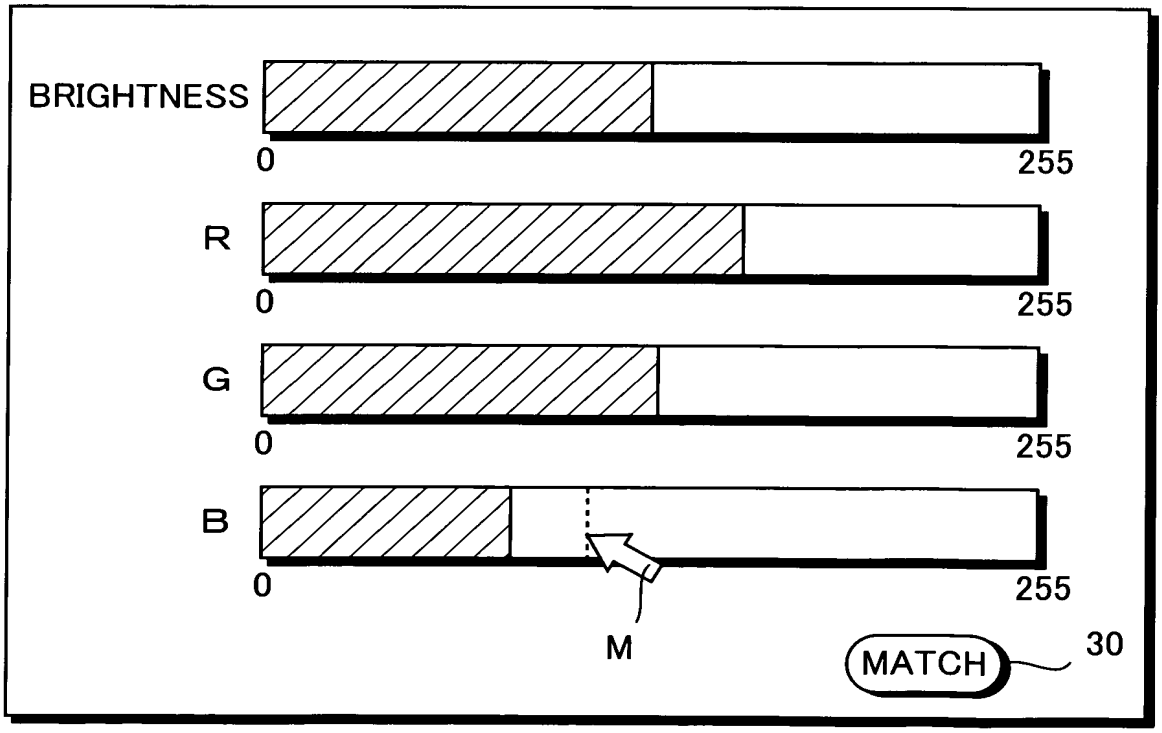

BRIGHTNESS
0
255
R
0
255
G
0
255
B
0
255
M
MATCH
30

Fig.7

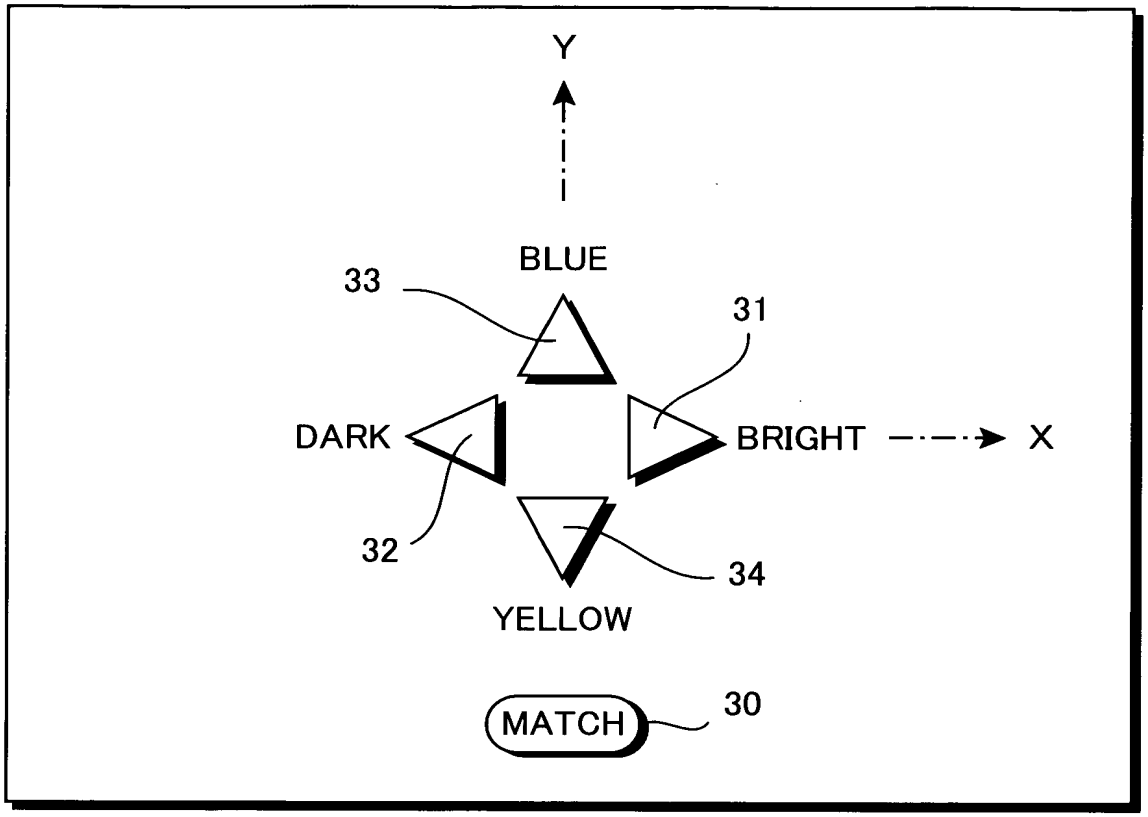

Y
BLUE
33
31
DARK
BRIGHT
X
32
34
YELLOW
MATCH
30

Fig.8

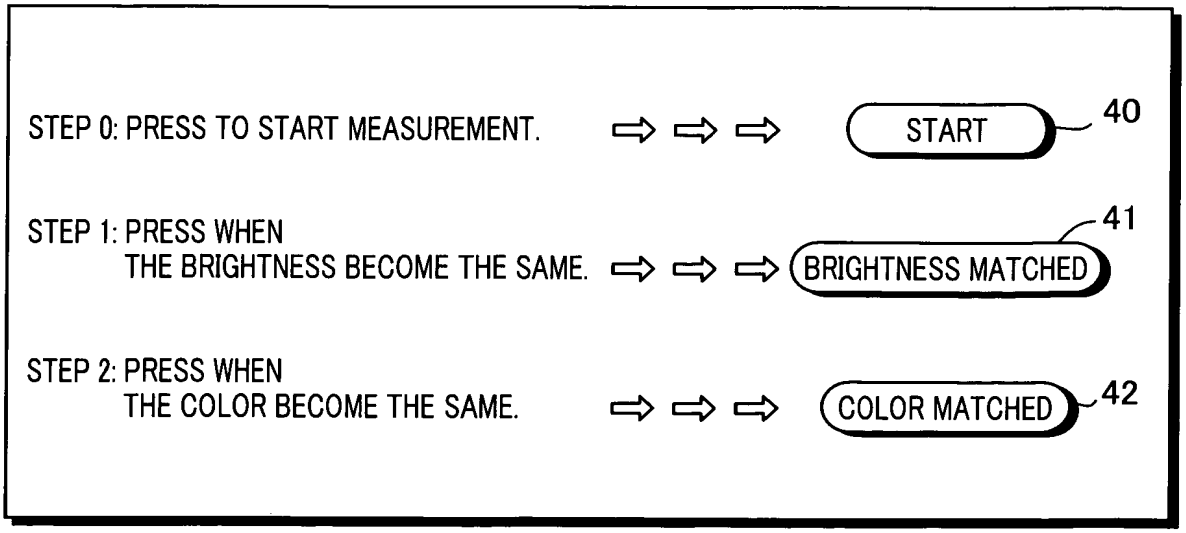

STEP 0: PRESS TO START MEASUREMENT.
START
40
STEP 1: PRESS WHEN
THE BRIGHTNESS BECOME THE SAME.
BRIGHTNESS MATCHED
41
STEP 2: PRESS WHEN
THE COLOR BECOME THE SAME.
COLOR MATCHED
42

Fig.9

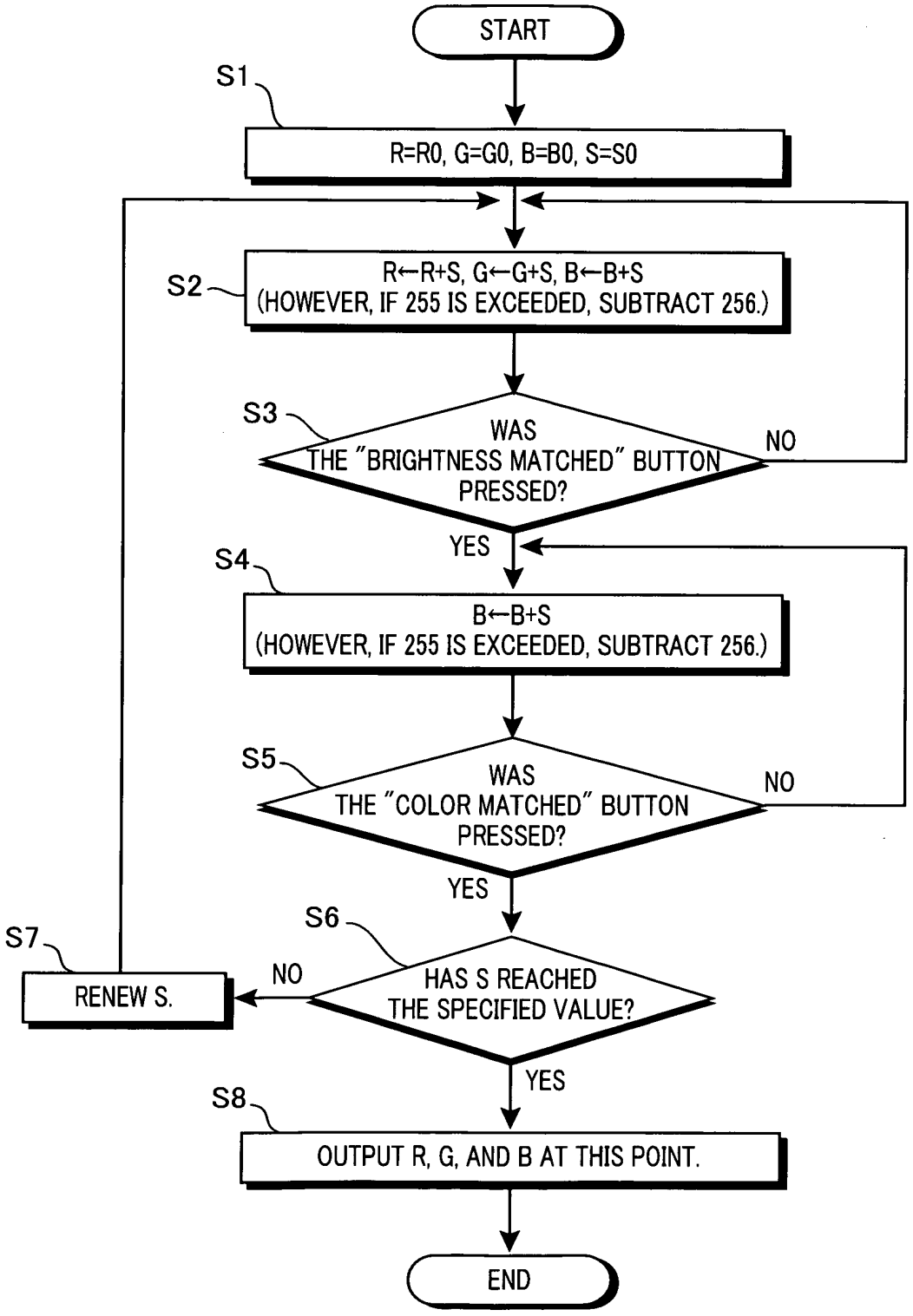

START
S1
R=R0, G=G0, B=B0, S=S0
S2
R←R+S, G←G+S, B←B+S
(HOWEVER, IF 255 IS EXCEEDED, SUBTRACT 256.)
S3
WAS THE "BRIGHTNESS MATCHED" BUTTON PRESSED?
NO
YES
S4
B←B+S
(HOWEVER, IF 255 IS EXCEEDED, SUBTRACT 256.)
S5
WAS THE "COLOR MATCHED" BUTTON PRESSED?
NO
YES
S6
HAS S REACHED THE SPECIFIED VALUE?
NO
S7
RENEW S.
YES
S8
OUTPUT R, G, AND B AT THIS POINT.
END

Fig.10

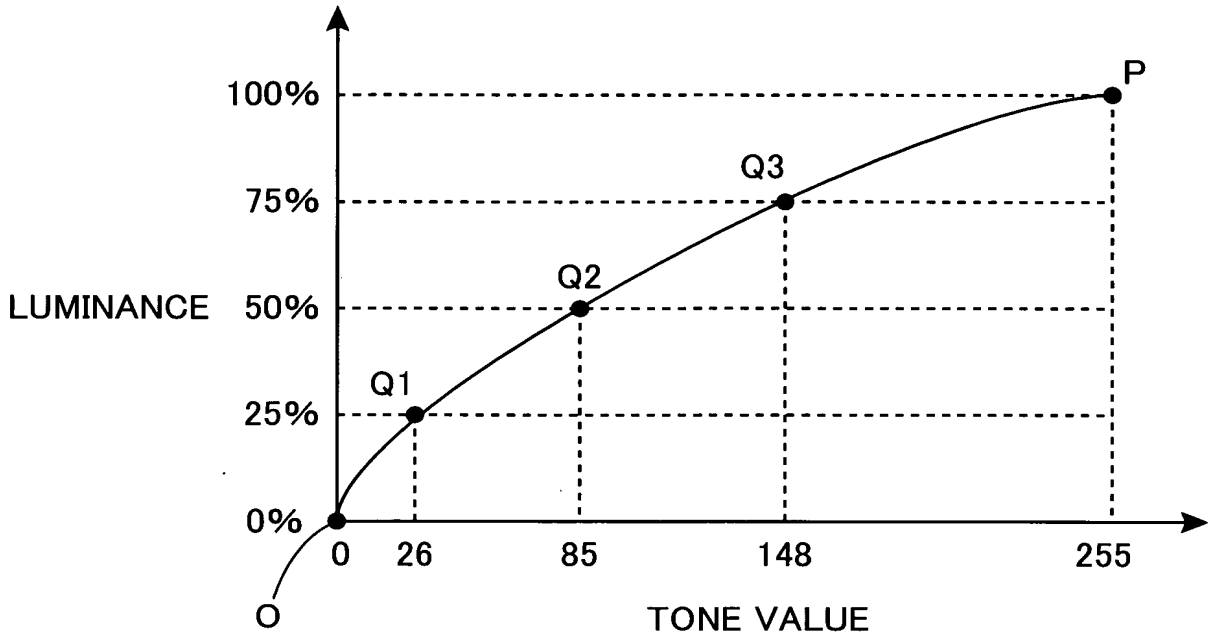

100%
75%
50%
25%
0%
LUMINANCE
P
Q3
Q2
Q1
O
0
26
85
148
255
TONE VALUE

Fig.11

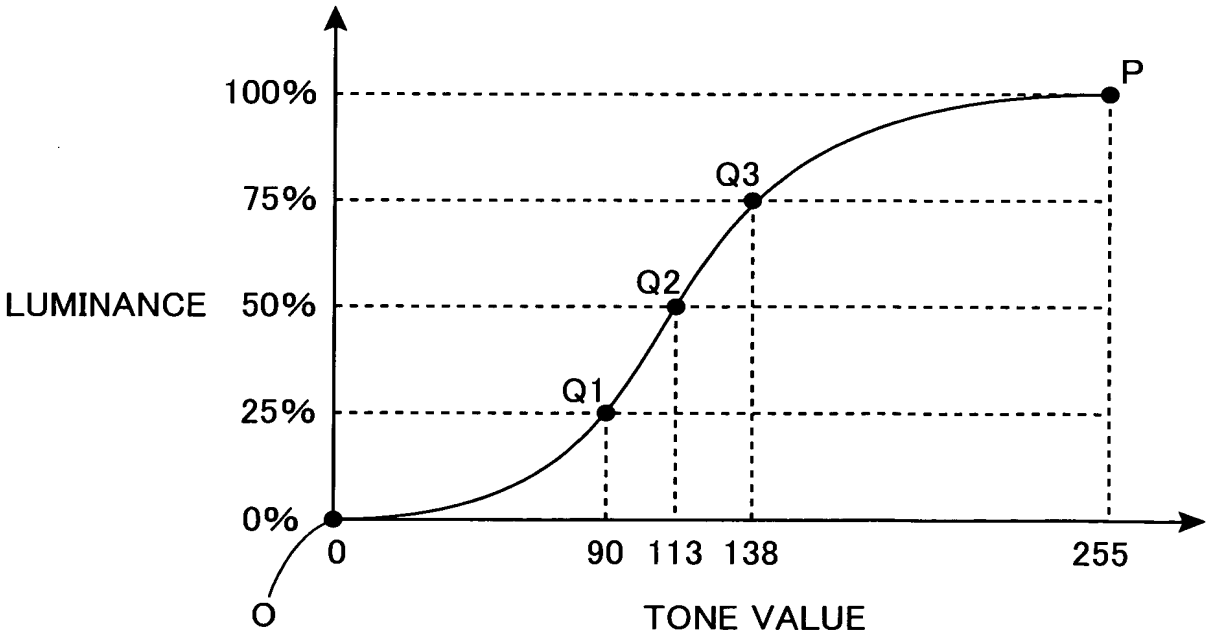

100%
75%
50%
25%
0%
LUMINANCE
P
Q3
Q2
Q1
O
0
90
113
138
255
TONE VALUE

Fig.12A

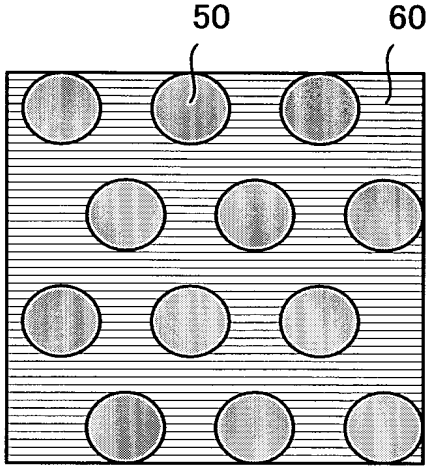



Fig.12B

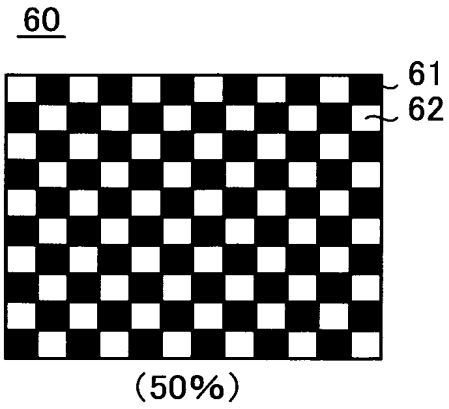



Fig.13A

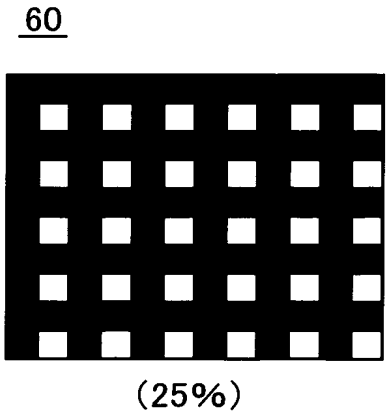



Fig.13B

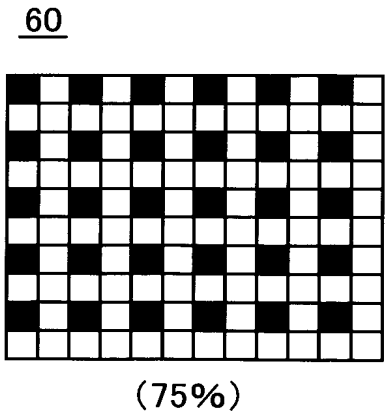


Fig.14

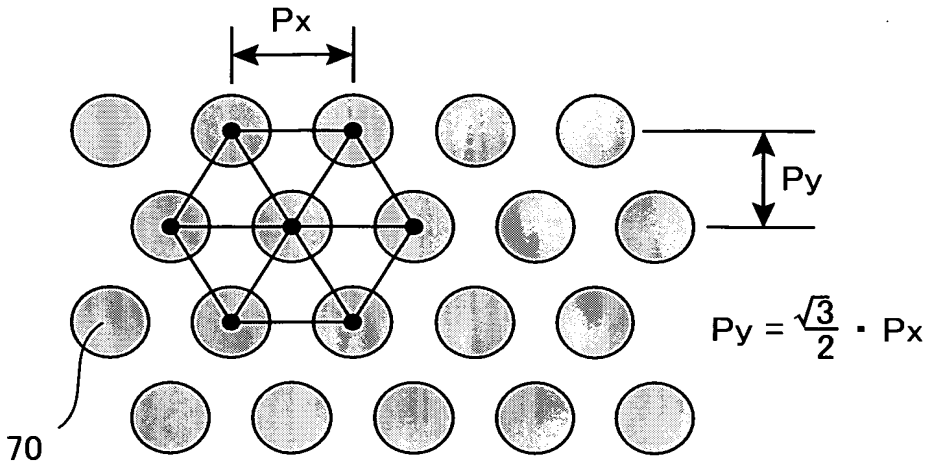



Fig.15

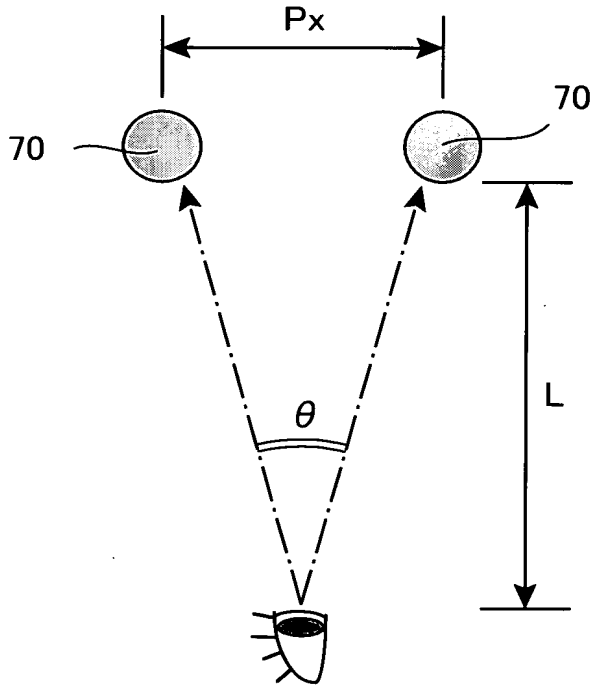


Fig.16

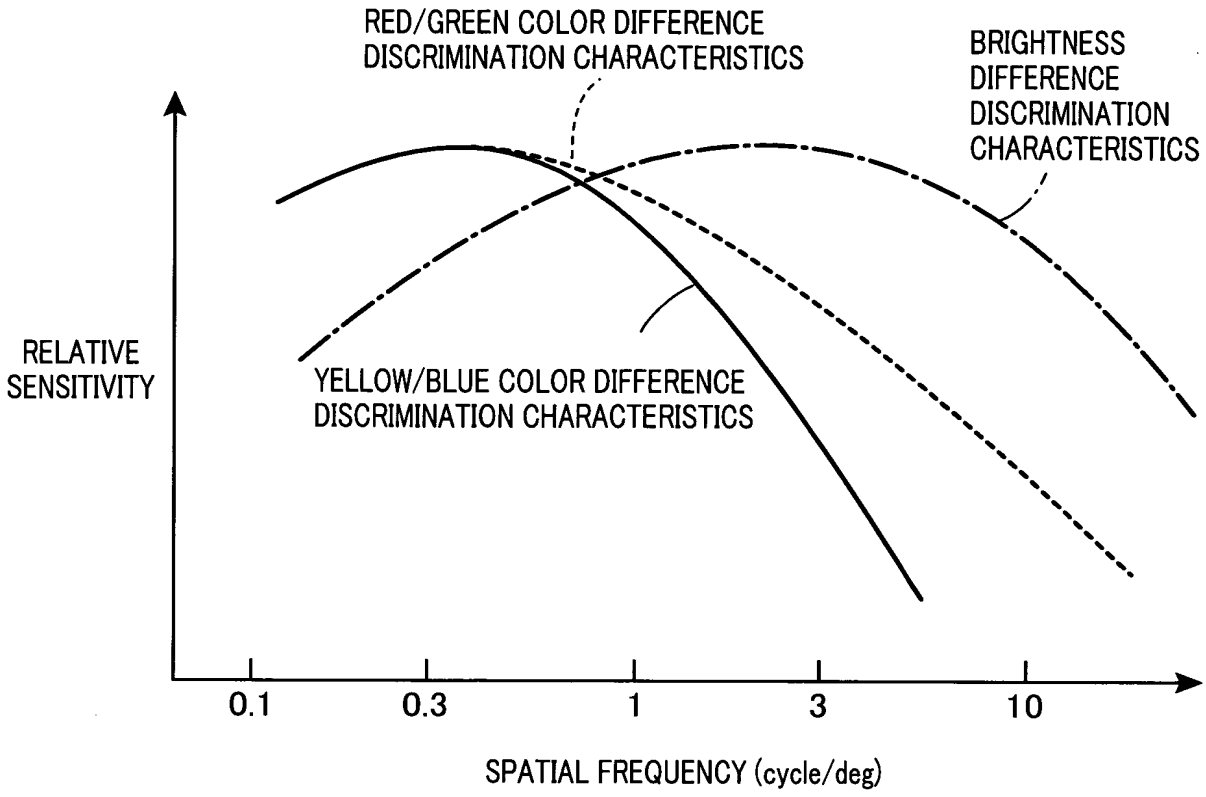



Fig.17

| | SPATIAL FREQUENCY (cycle/deg) | VIEWING ANGLE (deg/cycle) |
|---|---|---|
| OPTIMAL VALUE OF BRIGHTNESS DIFFERENCE DISCRIMINATION CHARACTERISTICS | 2.5 | 0.40 |
| OPTIMAL VALUE OF YELLOW/BLUE COLOR DIFFERENCE DISCRIMINATION CHARACTERISTICS | 0.4 | 2.50 |
| COMPROMISE VALUE OF BOTH CHARACTERISTICS | 0.6 | 1.67 |

Fig.18

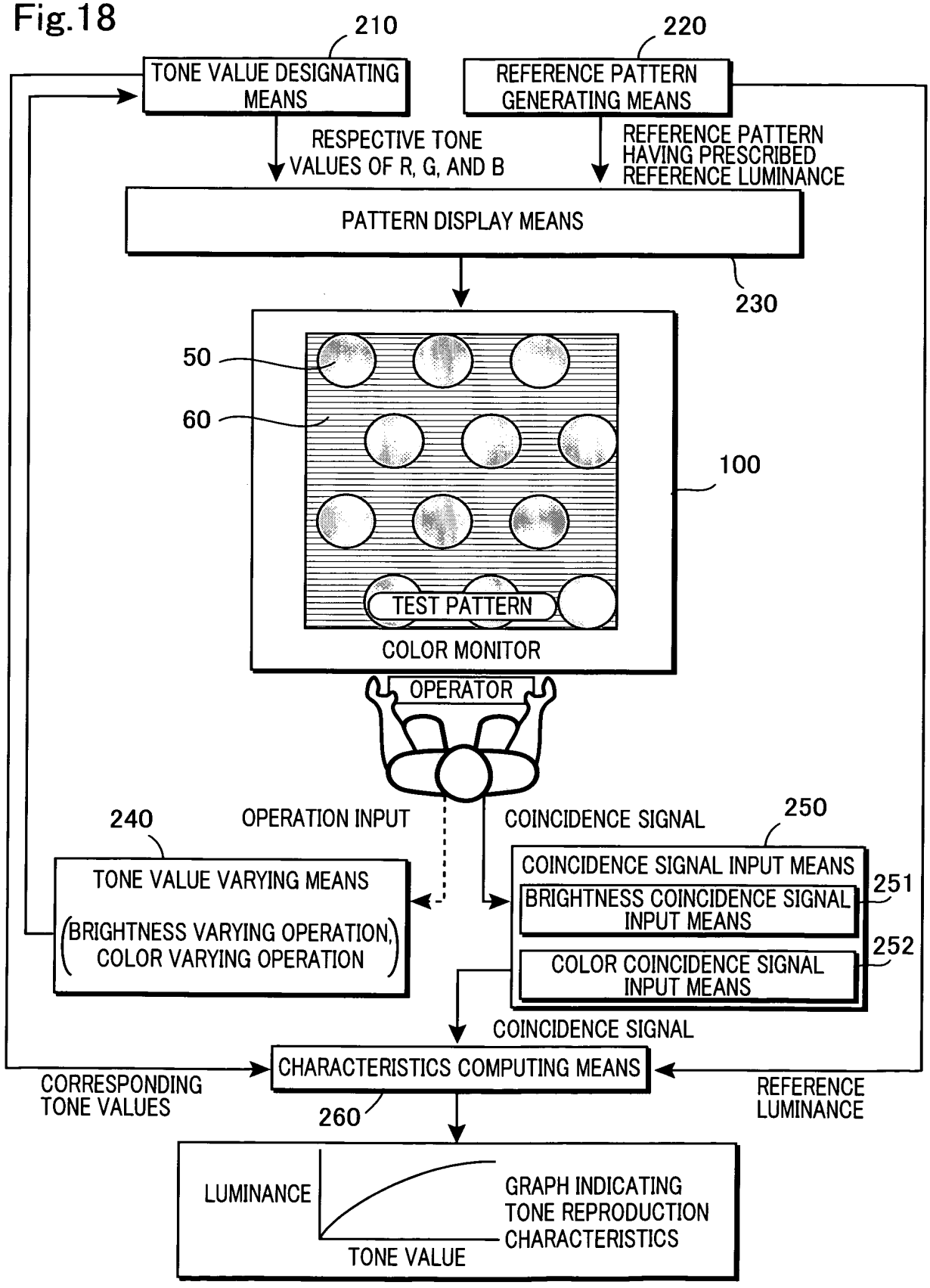
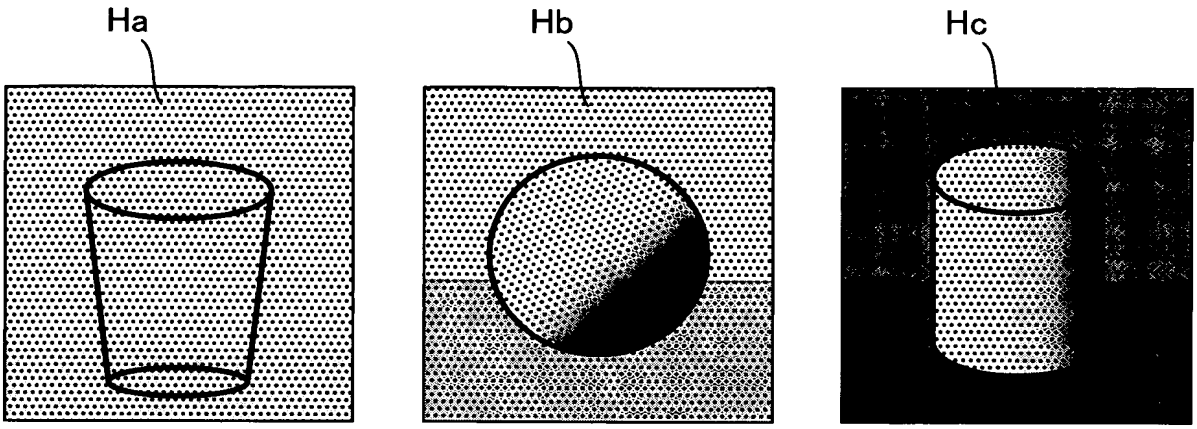

210
TONE VALUE DESIGNATING MEANS
220
REFERENCE PATTERN GENERATING MEANS
RESPECTIVE TONE VALUES OF R, G, AND B
REFERENCE PATTERN HAVING PRESCRIBED REFERENCE LUMINANCE
PATTERN DISPLAY MEANS
230
50
60
100
TEST PATTERN
COLOR MONITOR
OPERATOR
240
OPERATION INPUT
COINCIDENCE SIGNAL
250
TONE VALUE VARYING MEANS
(BRIGHTNESS VARYING OPERATION, COLOR VARYING OPERATION
COINCIDENCE SIGNAL INPUT MEANS
BRIGHTNESS COINCIDENCE SIGNAL INPUT MEANS
251
COLOR COINCIDENCE SIGNAL INPUT MEANS
252
COINCIDENCE SIGNAL
CHARACTERISTICS COMPUTING MEANS
CORRESPONDING TONE VALUES
REFERENCE LUMINANCE
260
LUMINANCE
GRAPH INDICATING TONE REPRODUCTION CHARACTERISTICS
TONE VALUE

Fig.19




(REPRESENTATIVE TONE VALUE:197)

(REPRESENTATIVE TONE VALUE:130)

(REPRESENTATIVE TONE VALUE:45)

Fig.20

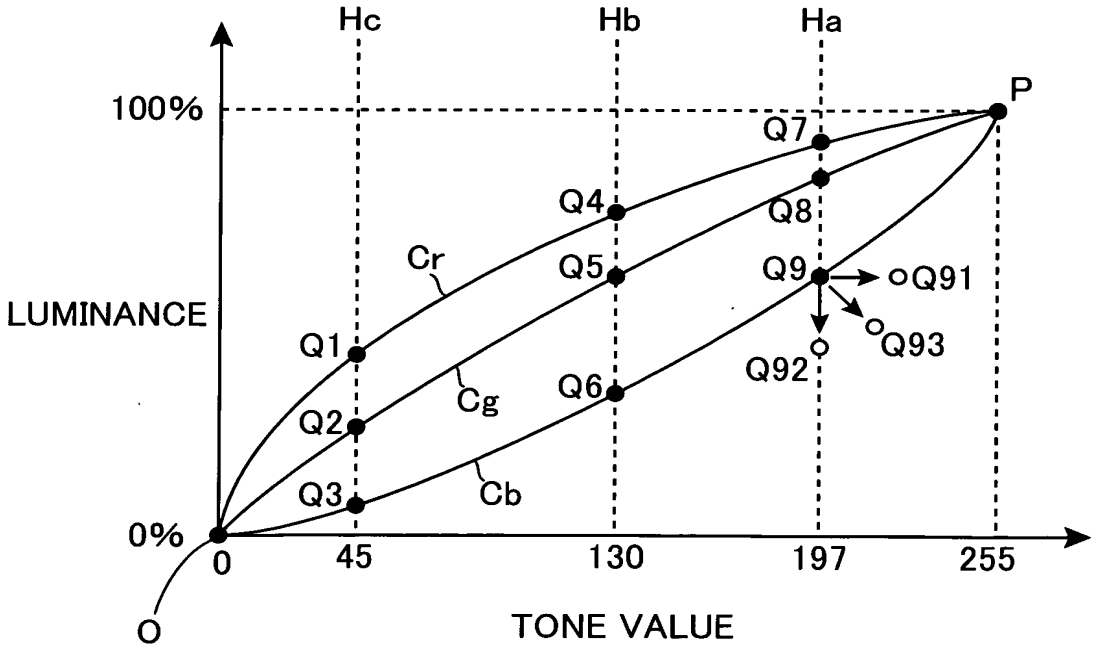


Fig.21

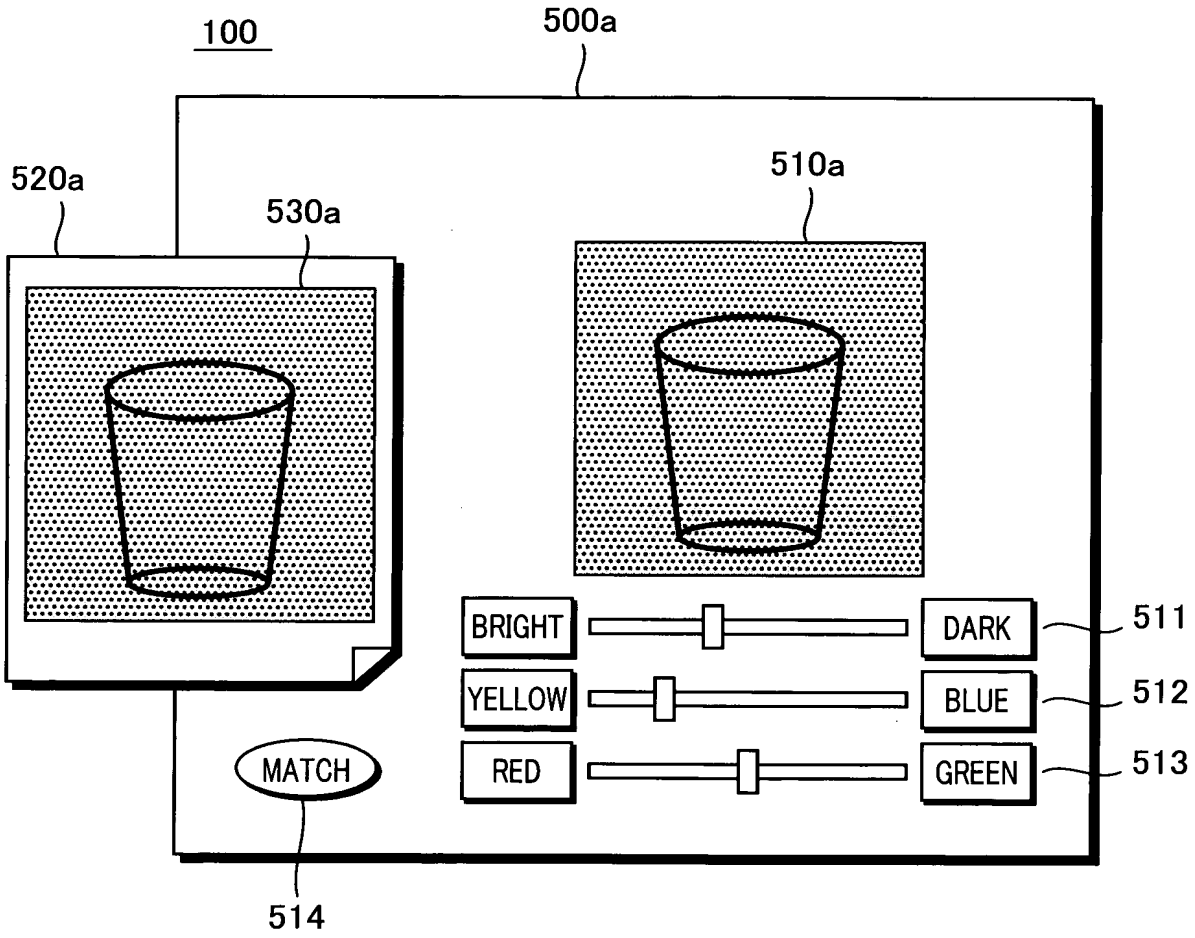

100
500a
520a
530a
510a
BRIGHT
DARK
511
YELLOW
BLUE
512
RED
GREEN
513
MATCH
514

Fig.22

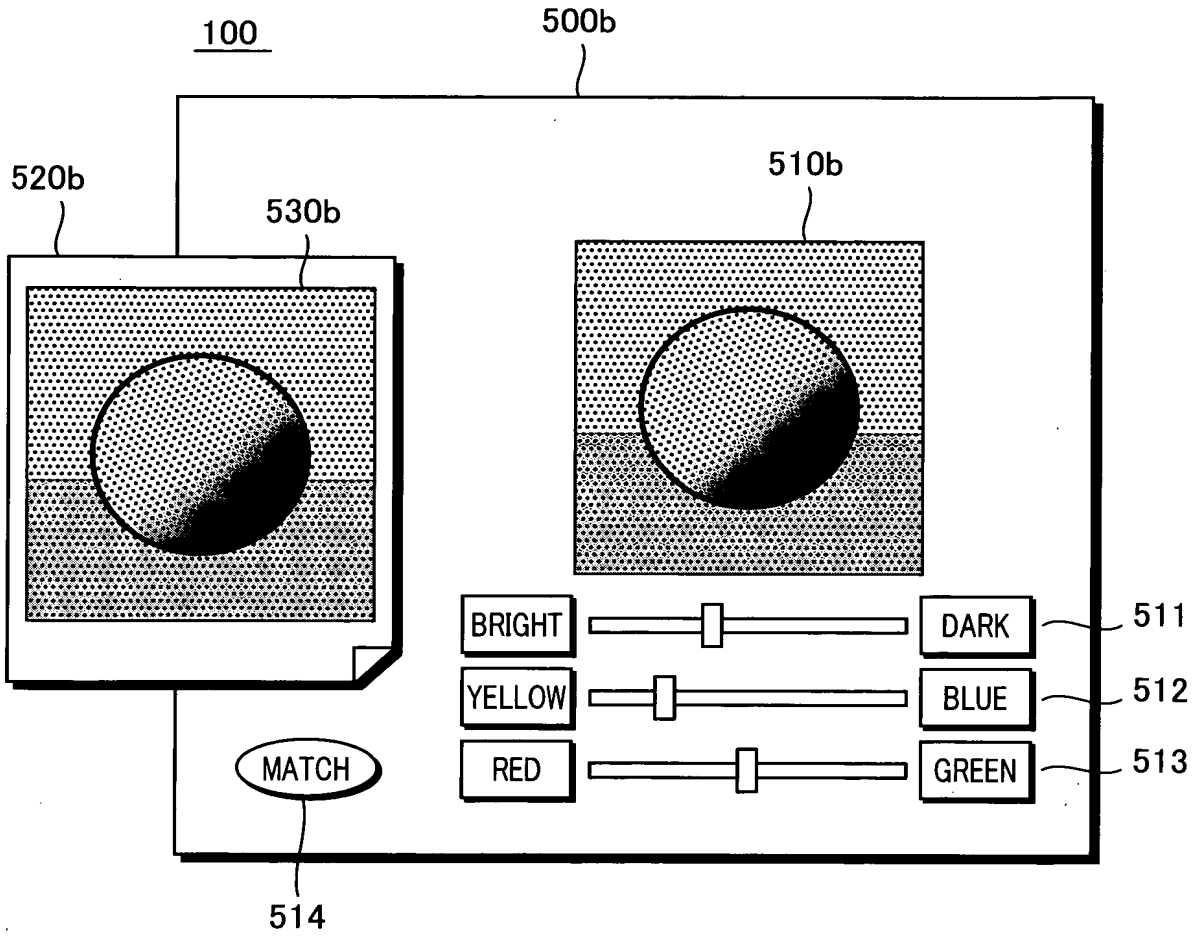

100
500b
520b
530b
510b
BRIGHT
DARK
511
YELLOW
BLUE
512
RED
GREEN
513
MATCH
514

Fig.23

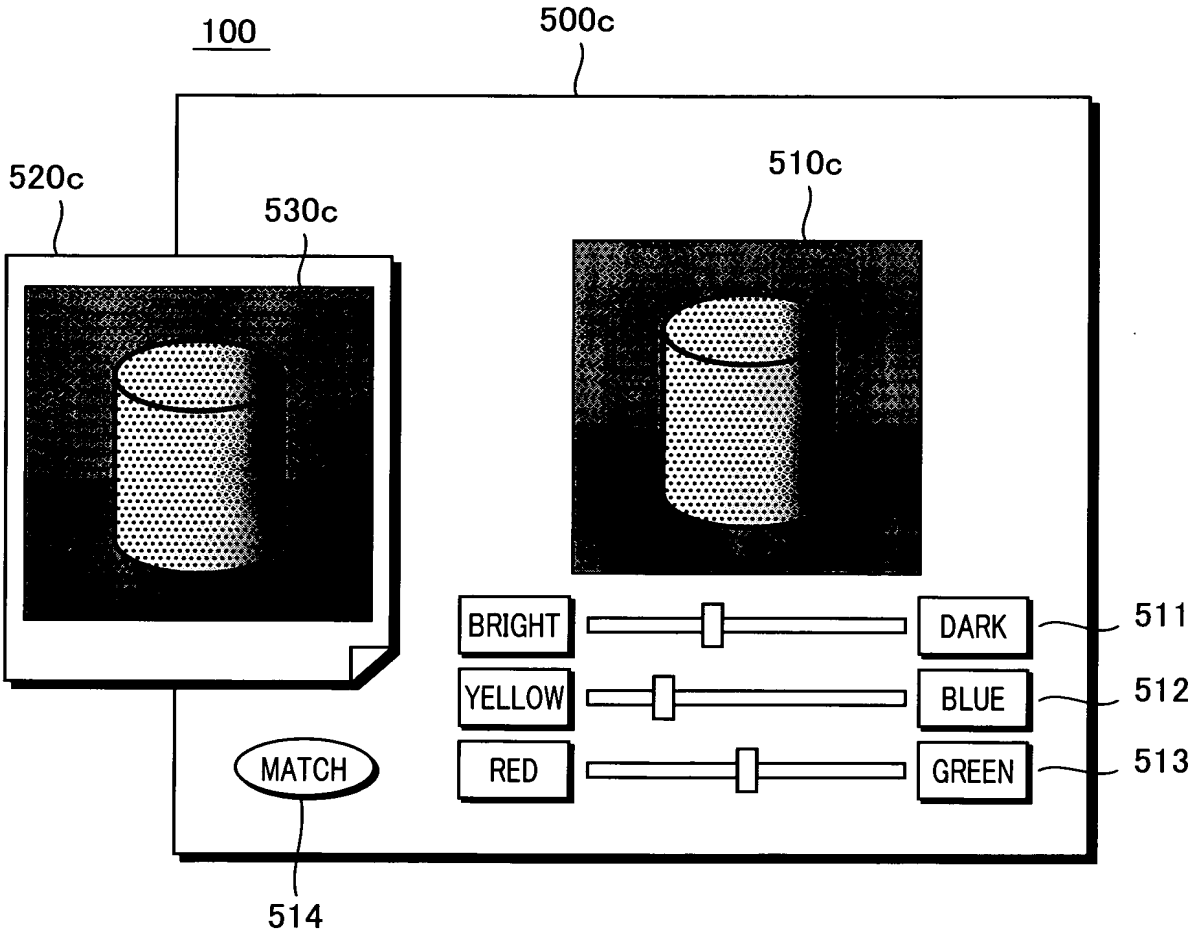

100
500c
520c
530c
510c
BRIGHT
DARK
511
YELLOW
BLUE
512
RED
GREEN
513
MATCH
514

Fig.24

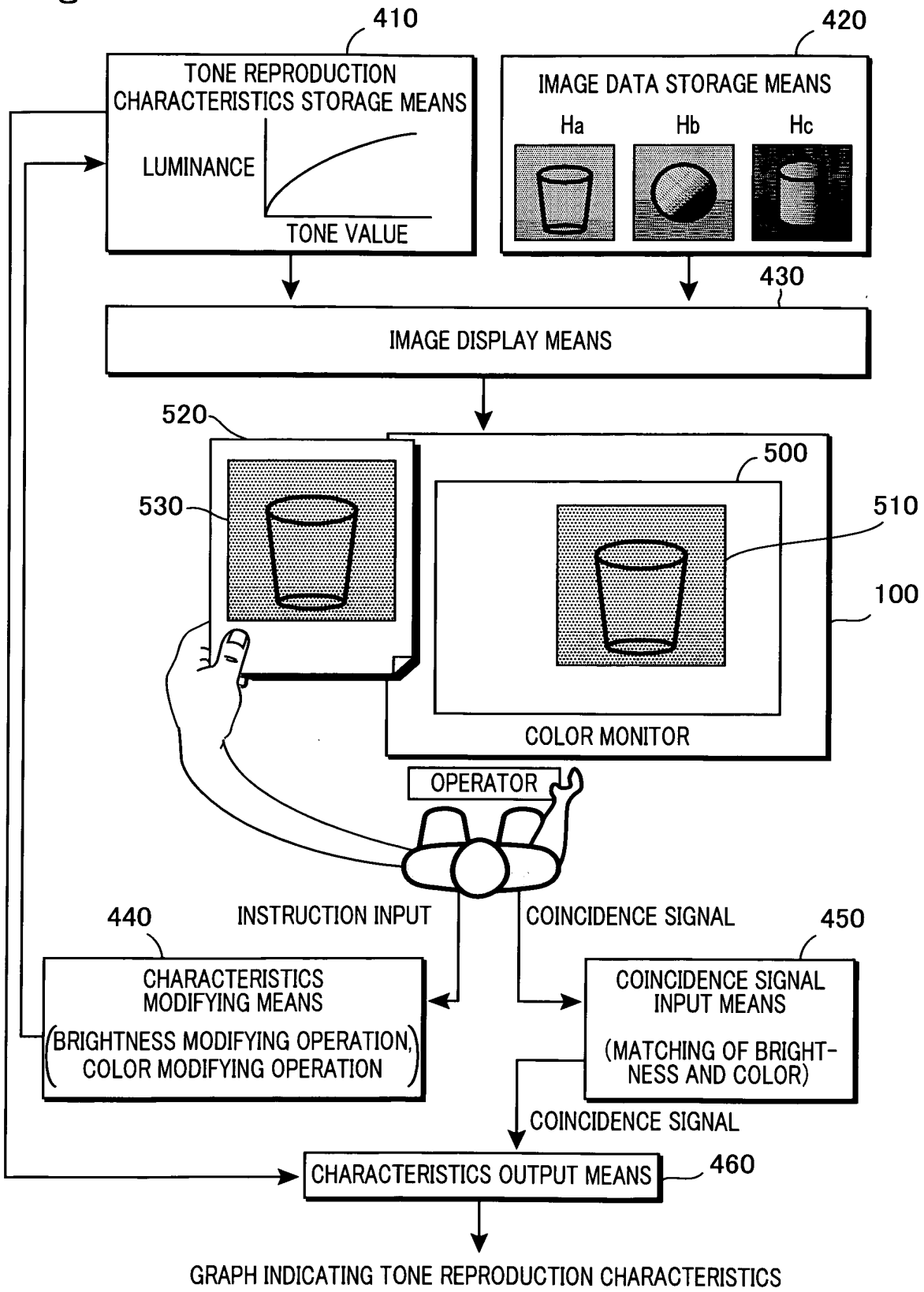

410
TONE REPRODUCTION CHARACTERISTICS STORAGE MEANS
LUMINANCE
TONE VALUE
420
IMAGE DATA STORAGE MEANS
Ha
Hb
Hc
430
IMAGE DISPLAY MEANS
520
530
500
510
100
COLOR MONITOR
OPERATOR
440
INSTRUCTION INPUT
COINCIDENCE SIGNAL
450
CHARACTERISTICS MODIFYING MEANS
(BRIGHTNESS MODIFYING OPERATION, COLOR MODIFYING OPERATION
COINCIDENCE SIGNAL INPUT MEANS
(MATCHING OF BRIGHTNESS AND COLOR)
COINCIDENCE SIGNAL
CHARACTERISTICS OUTPUT MEANS
460
GRAPH INDICATING TONE REPRODUCTION CHARACTERISTICS

Fig.26

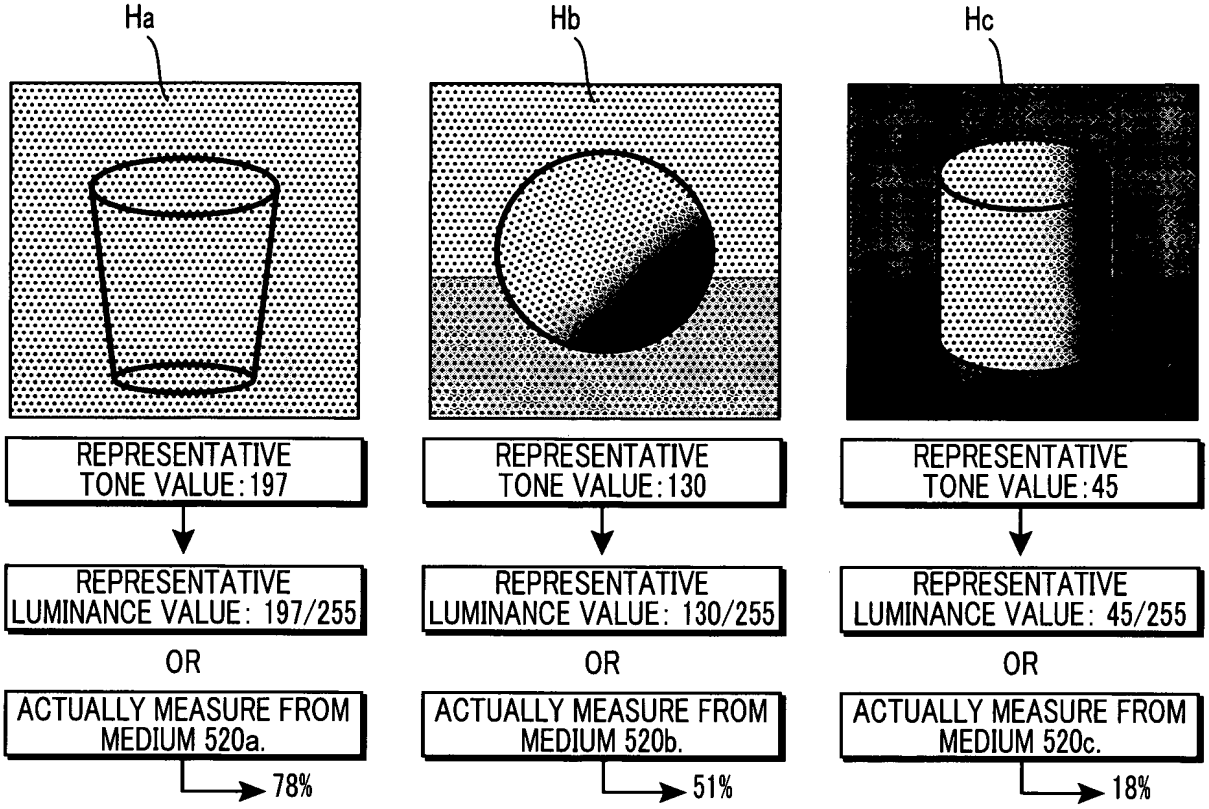

Ha
Hb
Hc
REPRESENTATIVE TONE VALUE:197
REPRESENTATIVE TONE VALUE:130
REPRESENTATIVE TONE VALUE:45
REPRESENTATIVE LUMINANCE VALUE: 197/255
REPRESENTATIVE LUMINANCE VALUE: 130/255
REPRESENTATIVE LUMINANCE VALUE: 45/255
OR
OR
OR
ACTUALLY MEASURE FROM MEDIUM 520a.
ACTUALLY MEASURE FROM MEDIUM 520b.
ACTUALLY MEASURE FROM MEDIUM 520c.
78%
51%
18%

Fig.27

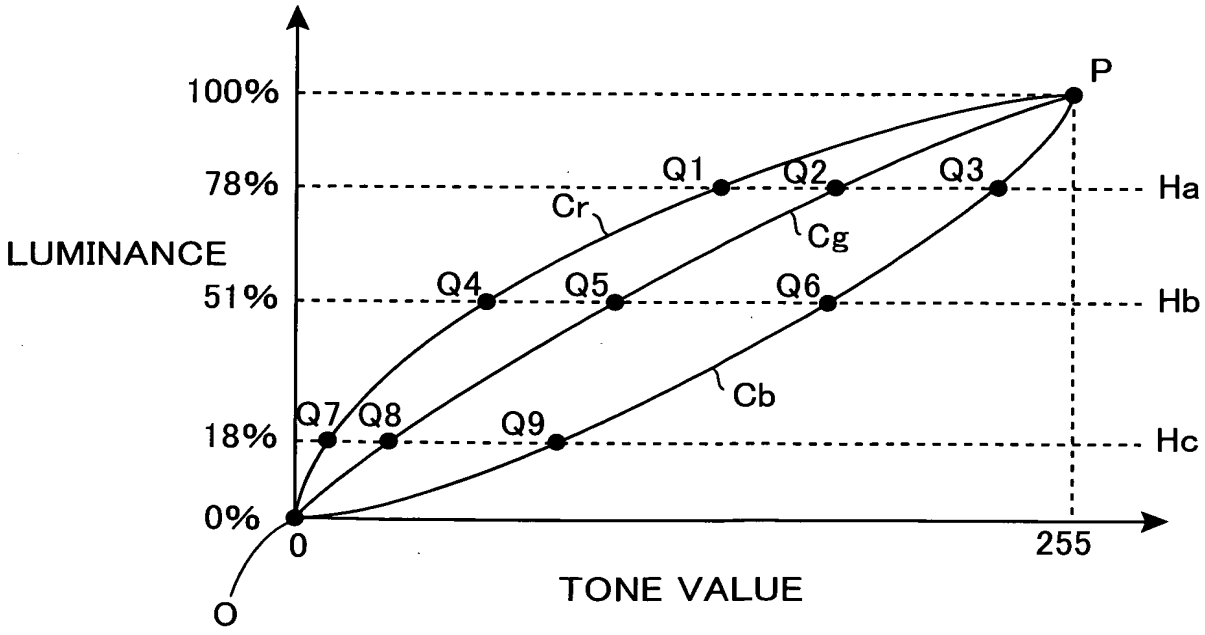
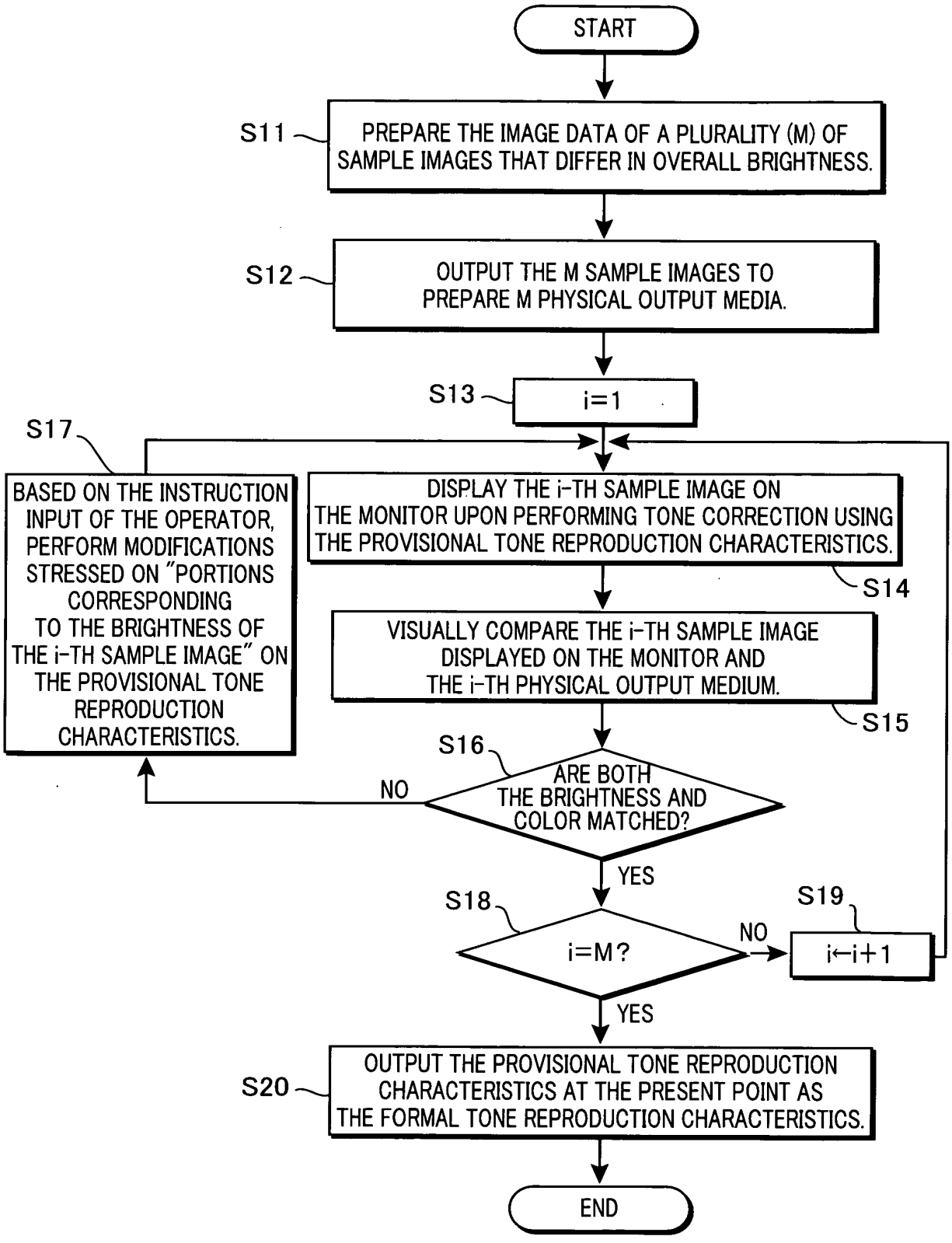

100%
78%
51%
18%
0%
LUMINANCE
P
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Cr
Cg
Cb
Ha
Hb
Hc
0
255
O
TONE VALUE

Fig.25


START
S11
PREPARE THE IMAGE DATA OF A PLURALITY (M) OF SAMPLE IMAGES THAT DIFFER IN OVERALL BRIGHTNESS.
S12
OUTPUT THE M SAMPLE IMAGES TO PREPARE M PHYSICAL OUTPUT MEDIA.
S13
i=1
S17
BASED ON THE INSTRUCTION INPUT OF THE OPERATOR, PERFORM MODIFICATIONS STRESSED ON "PORTIONS CORRESPONDING TO THE BRIGHTNESS OF THE i-TH SAMPLE IMAGE" ON THE PROVISIONAL TONE REPRODUCTION CHARACTERISTICS.
DISPLAY THE i-TH SAMPLE IMAGE ON THE MONITOR UPON PERFORMING TONE CORRECTION USING THE PROVISIONAL TONE REPRODUCTION CHARACTERISTICS.
S14
VISUALLY COMPARE THE i-TH SAMPLE IMAGE DISPLAYED ON THE MONITOR AND THE i-TH PHYSICAL OUTPUT MEDIUM.
S15
S16
ARE BOTH THE BRIGHTNESS AND COLOR MATCHED?
NO
YES
S18
i=M?
NO
S19
i←i+1
YES
S20
OUTPUT THE PROVISIONAL TONE REPRODUCTION CHARACTERISTICS AT THE PRESENT POINT AS THE FORMAL TONE REPRODUCTION CHARACTERISTICS.
END